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ABSTRACT

Distance Learning (DL) initiatives are proceeding full speed ahead, both within traditional universities and in "virtual" institutions specializing in on-line course delivery. Much has been written about the virtues and limitations, the obstacles and enablers, and the "Do's" and "Don'ts" of DL. However, considerable work remains in determining actual learning outcomes of the various approaches to DL. This paper describes a useful framework for designing and evaluating DL course delivery that is based on Maslow's Hierarchy of Needs model applied to virtual learning communities. The results of analyzing preliminary outcomes from a set of virtual courses in Introduction to Information Systems provide some initial support of the framework. Includes one figure: Maslow's hierarchy of needs and two tables: online hierarchy of needs and course evaluation results. (Contains 15 references.) (Author)

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A HIERARCHY OF NEEDS FOR A VIRTUAL CLASS

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ABSTRACT

Distance Learning (DL) initiatives are proceeding full speed ahead, both within traditional universities and in "virtual" institutions specializing in on-line course delivery. Much has been written about the virtues and limitations, the obstacles and enablers, and the "Do's" and "Don'ts" of DL. However, considerable work remains in determining actual learning outcomes of the various approaches to DL. This paper describes a useful framework for designing and evaluating DL course delivery that is based on Maslow's Hierarchy of Needs model applied to virtual learning communities. The results of analyzing preliminary outcomes from a set of virtual courses in Introduction to Information Systems provide some initial support of the framework.

INTRODUCTION

A number of factors have contributed to the growth and the phenomenon of Distance Learning (DL). University administrators are under continued pressure to increase enrollments, to decrease costs by serving more students with fewer faculty and university resources, and to make education more accessible to a wider range of learners, both geographically and demographically. Technological advances in software tools, data communication networks, and multiple media, most dramatically demonstrated in the exponential growth of the World Wide Web, have provided the infrastructure for making it possible to achieve these goals. Continued increases in existing and immigrant populations, strong economic growth in many regions, and a growing awareness of the economic benefits of a college education, have all combined to increase demand for post-secondary education from a widening diversity of demographic sources (Dede 1990).

The result is that DL initiatives are proceeding full speed ahead, both within traditional universities and in "virtual" institutions specializing in on-line course delivery. Much has been written about the virtues and limitations, the obstacles and enablers, and the "Do's" and "Don'ts" of DL. However, considerable work remains in determining actual learning outcomes of the various approaches to DL. This paper describes some relevant background and the subsequent evolution of a useful framework for designing and evaluating DL course delivery. The results of analyzing preliminary outcomes from a set of virtual courses in *Introduction to Information Systems* provide some initial support of the framework.

BACKGROUND

What is the definition of "Distance Learning?" DL means different things to different people. Its definition has evolved as computer and communications technologies have become more sophisticated, more powerful, less costly, and more widespread. For the purpose of this paper, DL is defined as course delivery over networks to multiple geographic locations using flexible access methods. The term DL is used synonymously with the term on-line learning, and also refers to wnat is sometimes called asynchronous

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learning, although DL can be both synchronous as well as asynchronous depending upon the tools used.

Distance Learning and Education Theory

The current state of DL represents the convergence of technical and social educational evolution. Pre-computer correspondence courses are often cited as the earliest examples of DL (Dunning 1990). However, the most traditional type of DL is that of the one-way video transmission of a lecture format to one or more classes of remotely located respondents. Advances in technology have facilitated changes in the perception and definition of DL from a passive 1-way video lecture model to an interactive student-instructor and student-student model employing a variety of communication media as needed (Bates 1991).

Education theories based on Vygotsky (Vygotsky 1978) and others have served as the foundation for the concept that effective learning must be active, cooperative, student-centered, and socially constructed (Damon 1984); (Topping 1992); (Webb 1982). A body of research known as computer-supported cooperative learning (CSCL) initially focused on the application of information technologies to individual students and small groups in a traditional classroom context (Koschmann 1996). This research stream offers insight into the now extensive use of the WWW and accompanying Internet tools to deliver interactive DL. At the same time, studies of computer-mediated communication (CMC) provide useful information about the effective use of various electronic media now used in delivering interactive instruction (Berge and Collins 1995).

Learning Communities

As the focus of computer-support for learning has evolved from individual interaction with a computer toward technology support for interaction among dispersed members of the group, an additional development in educational research and practice has become increasingly relevant: the learning community.

A learning community encompasses the idea that learners benefit more if they actively contribute to their own and others' learning. The members have a socially constructed, shared view of their goals and processes, and a sense of identity and belonging to the community. A virtual community is a real community but whose members interact electronically as well as, or, for some or all members, in place of physical interaction. A virtual learning community incorporates both the primary goal of learning and the notion that at least some members of the community do not interact face-to-face (FTF) and thus require various technologies to communicate (Hiltz 1994).

Although some DL research has focused on the pros and cons of particular CMC tools (e-mail, bulletin boards, chat), others have taken a more holistic view, demonstrating that a DL class can indeed result in an effective learning community (Powers and Mitchell 1997); (Haythornthwaite, Kazmer et al. 2000). An effective DL environment provides a flexible toolset that allows the instructor to adapt the appropriate tools to various pedagogical methods and to create a learner-centered environment by identifying what knowledge and skills the student brings to the course and configures the environment to meet her there (Bransford, Brown et al. 2000). It also allows the students to select tools that match the various types and levels of interaction (public/private, informal/formal, spontaneous/reflective) needed in developing a virtual learning community (VLC), as well as the tools that can best exploit the skills and knowledge they bring to the class.

The purpose of this research is to address the following question: *How can our understanding of virtual learning communities help us to design, and to evaluate the effectiveness of, DL experiences that support pedagogical goals and contribute to student learning outcomes?*

RESEARCH FRAMEWORK

Maslow (1970) developed a Hierarchy of Needs, which describes five layers of needs that humans experience: physiological needs, safety needs, the need for love and belonging, esteem needs, and the need for self-actualization (Figure 1). Lower level needs must be fairly well met before an individual experiences higher level needs.

FIGURE 1
MASLOW'S HIERARCHY OF NEEDS

According to the theory, the first four levels represent deficit needs: an individual feels the need if he does not have enough. After a need is met, it is no longer felt. After one's needs are more or less met on one level, a person feels the needs on the next level. For example, if an individual has no food or water and no friends, he will first try to get enough food and water before seeking friends. Self-actualization, or growth motivation, is not a deficit need; rather, it is continually felt. Once experienced, the need to fulfill one's potential to the fullest does not stop. All deficit needs must be fairly well met before a person can be self-actualizing. Self-actualized people are independent, yet have intimate personal relationships with a few people. They are compassionate and creative, and accept themselves and others for what they are. Few people are self-actualizing (Maslow 1970).

This Hierarchy of Needs can be applied to community building on the World Wide Web (Kim 2000). Table 1 summarizes this concept. Members of a virtual community go through a similar set of levels of need in order to become active, contributing members of the virtual community. A participant must first be able to gain access to the community, through technology and training (knowing how to access it). Once able to take this for granted, an individual experiences the need to feel safe from unwanted or unexpected negative interactions from other community members. The next level is where she will successfully interact with other community members and develop a sense of identity with the community. Once this need is met, she is able to move on to making positive, acknowledged contributions to the community. The highest level, which is likely to be achieved only by a small proportion of community members, involves taking on recognized community roles and helping to shape the continuing evolution of the community, which in turn helps the individual develop.

TABLE 1
ONLINE HIERARCHY OF NEEDS[1]

Level of Need	Maslow's Definition	Corresponding Online Learning Need
Physiological	Oxygen, water, food, clothing, shelter, health	System and Internet access
Safety	Safe circumstances, security, protection, stability, structure, order	Protections from personal attacks and hackers. Structure, order, consistency
Belonging	Ability to give and receive love; need to be a member	Belonging to a community (the class as a whole) and to subgroups (e.g., teams)
Esteem	Status, recognition, attention, self-respect, confidence, competence, achievement	The ability to contribute to the course/community and be respected for it. Competence and achievement.
Self-actualization	Ability to fulfill one's potential	The ability to take a role in the course/community that develops and challenges one's self.

[1] Adapted from Kim, "Building a Successful Community" (p. 9).

How can educators apply this model toward building virtual learning communities in distance learning classes? Students who are having trouble accessing the systems, either due to technical problems or lack of training, cannot be expected to move on to higher levels of participation until these issues have been resolved. Likewise, if students do not feel safe from attacks or criticisms when making contributions, they will not be able to become contributing members of discussions or sub-groups (teams). Finally, students who do not feel a sense of belonging to the community or sub-group are less likely to contribute, and thus likely to get less from the course.

The on-line hierarchy describes how students can move from being individual learners to becoming active members of a learning community, through knowledge and assessment. Because students entering a course may come from a variety of backgrounds and perspectives, DL instructors should at least initially emphasize a learner-centered approach. Ongoing assessment will provide feedback to the instructor and students about their need levels in the on-line hierarchy, as well as in their knowledge in the course domain. Students who have unmet needs at lower levels are likely to perform more poorly until those needs are met and they can move on to become more active, participating members of the learning community.

RESEARCH METHODS

In order to gain some initial support for the framework described above, data were collected from two distance learning sections of an undergraduate Introductory Information Systems class. There were 52 students enrolled in the two sections, 28 in one section and 24 in the other. Text, on-line notes, assignments, projects, grading criteria, and exams were identical in both sections. Each student completed five individual homework assignments, including three "hands-on" assignments (constructing a spreadsheet, database, and a web store) and two written exercises (on expert systems and networks). Each class had its own WebBoard where questions were posted and discussed by the class as a whole. Participation in these discussions was required.

Students in each class were randomly assigned to a team at the start of the course and virtually no one knew their teammates before the class. Each team was given a private discussion area on the WebBoard, which they could use for communication. However, no restrictions were placed on communication methods—teams could meet face-to-face if they wished. Two team projects were required. There was a short hardware configuration assignment due within the first few weeks of the course, designed to help teams get used to working together. The second project involved researching a topic, and then designing and constructing a web site to educate the class about the topic.

Although WebCT was the primary online tool used in both sections, technological limitations prevented all its features from being used. Students took online quizzes covering each chapter in WebCT and had the option to first take practice quizzes. Narrative lecture notes were available online for each chapter, explaining material that the instructor would have covered in a lecture. Due to the technological difficulties, the asynchronous conferencing facility, e-mail, and chat features of WebCT were not used. Instead, the classes used external e-mail, and O'Reilly & Associates, Inc. WebBoard for web conferencing (primarily through asynchronous postings, although the realtime chat feature was available for student teams to use).

RESULTS

Several items were included on the course evaluation administered at the end of the semester to determine student perceptions of the various online tools used in the course (Table 2). Each item was answered on a scale of "1" (Poor) to "5" (Excellent). Thirteen students answered the questions.

As can be seen in Table 2, students believed that the on-line quizzes (both practice quizzes and graded quizzes) contributed most to their learning, followed closely by individual assignments (i.e. homework). Both WebBoard discussions and team projects were considered less than "good" in helping students learn. The nonparametric Mann-Whitney test was used to identify differences in response between the two sections; no significant difference was found (significance for all tools except WebBoard was greater than 0.80; WebBoard was $p = 0.29$), indicating responses were not affected by the class or instructor.

As shown in Table 2, the more familiar and structured tools were preferred. That is, practice quizzes, homework, and lecture notes, familiar tools to students, were preferred over the less structured and less familiar Webboard discussions and collaborating with a team, largely by electronic means.

TABLE 2
COURSE EVALUATION RESULTS

Item	Mean*	S.D.
How helpful were the WebCT On-Line Quizzes in helping you learn the course material?	3.93	0.83
How helpful were the individual assignments in helping you learn the course material?	3.71	0.85
How helpful were the WebCT Notes in helping you learn the course material?	3.29	0.99
How helpful were the WebBoard Discussions/Conferences in helping you learn the course material?	2.94	1.29
How helpful were the Team Projects in helping you learn the course material?	2.88	1.20

Students were also asked how their team communicated while working on assignments, reporting the proportion of communications taking place face-to-face, via phone, using e-mail, on the WebBoard, or using online chat. An additional analysis was performed which linked team project outcomes (grades) to the their usage of these CMC tools. Although teams could use any means to communicate (in fact, there were scheduled optional opportunities to allow them to meet on campus), all but one team chose e-mail or the WebBoard for most of their communication. In general, teams who relied almost completely on e-mail to communicate received lower grades than did those who supplemented e-mail with asynchronous web conferencing and other media.

DISCUSSION

How do these results contribute to our understanding of designing virtual courses and learning communities? In the context of the hierarchy, it makes sense that some students preferred the more structured and familiar tools, and were hesitant about WebBoard participation and virtual teamwork. This was the first distance learning class for almost half of the students. Most of the remaining students had taken only one previous distance class; a few had taken more. Thus, some of the students were still trying to understand the technology and make it work; others were seeking order and possibly feared personal attacks.

Since most people have not reached Maslow's self-actualizing level, educators must understand that most students are struggling to meet deficit needs (physiological, belonging, esteem). Instructors need to provide them with tools and pedagogy to help them meet these needs. This meshes well with current learning theory that learner-centered environments are optimal. Learner-centered environments diagnose where the student is and start from that point (Bransford, Brown et al. 2000). In short, students cannot be expected to engage in lively real-time debates when they cannot maintain a constant connection to their ISP. Many of the students in these two sections were still trying to figure out how a distance class works, as well as simply how to get on-line consistently. Therefore, it is not unexpected that they preferred the most structured and familiar tools: quizzes and notes.

The results from the team project analysis suggest that students who relied primarily on e-mail communication may have been lower in the hierarchy of needs and this resulted in lower performance overall. A tentative conclusion might be that those students who performed better had moved to higher levels and were able to make more effective and appropriate use of the variety of tools available.

CONCLUSIONS AND FUTURE RESEARCH

Clearly, the data discussed here was collected from *post-hoc* personal reports from a very limited sample and can only be used to suggest directions for further research. The sample consisted of general business students taking a required Information Systems course. However, the model offers much potential in guiding our design and evaluation of DL courses. DL courses need to determine and address the unmet lower level needs of incoming students (many institutions now offer self-assessments which contribute to this). In addition, students and instructors need flexible toolkits that offer them a graduated progression from more comfortable to more challenging tools. Finally, the virtual learning community approach, enriched by the on-line hierarchy of needs and with a learner-centered emphasis, provides a rich context for design and assessment of DL.

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